

What is claimed is:

1. A cutting tool for simultaneously facing and grooving a target surface by moving in a forward direction defined parallel to said target surface, said cutting tool  
5 having a front surface facing said forward direction and comprising a facing part and a grooving part, wherein each of said side surfaces of said grooving part and said facing surface join through beveled surface portion.

2. The cutting tool of claim 1 wherein said beveled surface is smoothly  
10 curved with a minimum radius of curvature of 0.05mm.

3. The cutting tool of claim 1 wherein said beveled surface portion includes one or more mutually adjacent flat surface parts, each of said one or more flat surface parts making  $30^{\circ} \sim 60^{\circ}$  with said facing surface.  
15

4. The cutting tool of claim 1 wherein:  
said facing part has a width of 0.2 ~ 50mm in a lateral direction parallel to said target surface and perpendicular to said forward direction, and surface roughness of 50 ~ 1000 mesh on said facing part bottom surface; and  
20 said grooving part protrudes from said facing bottom surface of said facing part towards said target surface by a groove depth of 0.1 ~ 0.5mm.

5. The cutting tool of claim 2 wherein:  
said facing part has a width of 0.2 ~ 50mm in a lateral direction parallel to said target surface and perpendicular to said forward direction, and surface roughness of 50 ~ 1000 mesh on said facing part bottom surface; and  
25 said grooving part protrudes from said facing bottom surface of said facing part towards said target surface by a groove depth of 0.1 ~ 0.5mm.

30 6. The cutting tool of claim 3 wherein:

said facing part has a width of 0.2 ~ 50mm in a lateral direction parallel to said target surface and perpendicular to said forward direction, and surface roughness of 50 ~ 1000 mesh on said facing part bottom surface; and

said grooving part protrudes from said facing bottom surface of said facing part  
5 towards said target surface by a groove depth of 0.1 ~ 0.5mm.

7. The cutting tool of claim 4 wherein:

said facing front surface makes a facing edge angle of  $10^{\circ}$  ~  $110^{\circ}$  with said  
bottom surface;

10 said grooving part has surface roughness 200 ~ 3000 mesh on said front surface,  
side surfaces with surface roughness 200 ~ 3000 mesh, a maximum width of 0.1 ~ 10mm  
in said lateral direction on said front surface and a bottom grooving surface with surface  
roughness of 200 ~ 3000 mesh; and

said bottom grooving surface makes a bottom clearance angle of  $-10^{\circ}$  ~  $+80^{\circ}$  with  
15 said target surface and a top rake angle of  $10^{\circ}$  ~  $110^{\circ}$  with said front surface.

8. The cutting tool of claim 5 wherein:

said facing front surface makes a facing edge angle of  $10^{\circ}$  ~  $110^{\circ}$  with said  
bottom surface;

20 said grooving part has surface roughness 200 ~ 3000 mesh on said front surface,  
side surfaces with surface roughness 200 ~ 3000 mesh, a maximum width of 0.1 ~ 10mm  
in said lateral direction on said front surface and a bottom grooving surface with surface  
roughness of 200 ~ 3000 mesh; and

said bottom grooving surface makes a bottom clearance angle of  $-10^{\circ}$  ~  $+80^{\circ}$  with  
25 said target surface and a top rake angle of  $10^{\circ}$  ~  $110^{\circ}$  with said front surface.

9. The cutting tool of claim 6 wherein:

said facing front surface makes a facing edge angle of  $10^{\circ}$  ~  $110^{\circ}$  with said  
bottom surface;

30 said grooving part has surface roughness 200 ~ 3000 mesh on said front surface,  
side surfaces with surface roughness 200 ~ 3000 mesh, a maximum width of 0.1 ~ 10mm

in said lateral direction on said front surface and a bottom grooving surface with surface roughness of 200 ~ 3000 mesh; and

said bottom grooving surface makes a bottom clearance angle of  $-10^{\circ} \sim +80^{\circ}$  with said target surface and a top rake angle of  $10^{\circ} \sim 110^{\circ}$  with said front surface.

5

10. The cutting tool of claim 7 wherein said grooving part has a gradually decreasing width from said front surface whereby said side surfaces of said grooving part is not parallel, creating a side clearance angle

10

11. The cutting tool of claim 8 wherein said grooving part has a gradually decreasing width from said front surface whereby said side surfaces of said grooving part is not parallel, creating a side clearance angle

15

12. The cutting tool of claim 9 wherein said grooving part has a gradually decreasing width from said front surface whereby said side surfaces of said grooving part is not parallel, creating a side clearance angle

20

13. The cutting tool of claim 7 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than  $30^{\circ}$  and a height of less than 0.2mm.

25

14. The cutting tool of claim 8 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than  $30^{\circ}$  and a height of less than 0.2mm.

15. The cutting tool of claim 9 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than  $30^{\circ}$  and a height of less than 0.2mm.

16. The cutting tool of claim 10 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

5 17. The cutting tool of claim 11 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

10 18. The cutting tool of claim 12 wherein each of said side surfaces of said grooving has a tapered bottom portion and a tapering angle less than 30° and a height of less than 0.2mm.

15 19. A method of simultaneously facing a target surface and cutting a groove therein, said method comprising the step of preparing a cutting tool as described in claim 1 and moving said cutting tool parallel to said target surface while contacting said target surface wherein a groove with specified dimensions is cut in said target surface simultaneously as said target surface is polished to a specified surface roughness.